



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,041	10/13/2006	Volodymyr Lysenko	13885-3	9342
45473	7590	10/15/2009	EXAMINER	
BRINKS, HOFER, GILSON & LIONE			JOHNSON, KEVIN M	
P.O. BOX 1340			ART UNIT	PAPER NUMBER
MORRISVILLE, NC 27560			1793	
MAIL DATE		DELIVERY MODE		
10/15/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/566,041	<b>Applicant(s)</b> LYSENKO ET AL.
	<b>Examiner</b> KEVIN M. JOHNSON	<b>Art Unit</b> 1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 6/2/2009.

2a) This action is FINAL.      2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 16-30 is/are pending in the application.

4a) Of the above claim(s) 20-30 is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 16-19 is/are rejected.

7) Claim(s) 18 and 19 is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO-1448)  
 Paper No(s)/Mail Date 8/11/2006

4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_

5) Notice of Informal Patent Application

6) Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election with traverse of Group I, claims 16-19, in the reply filed on 6/2/2009 is acknowledged. The traversal is on the ground(s) that all of the claims share a special technical feature, namely a hydrogen reservoir that contains nanostructured silicon. This is not found persuasive because as previously presented hydrogen reservoirs containing nanostructured silicon are known in the art (Tam US 5604162).

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 20-30 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim.

***Information Disclosure Statement***

3. The information disclosure statement (IDS) submitted on 8/11/2006 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

***Claim Objections***

4. Claims 18 and 19 are objected to because of the following informalities: the language limiting the silicon nanostructure is awkward and unconventional. Appropriate correction is required. While it is clear that the claims require porous compacted nanostructured silicon and ground and compacted porous silicon respectively, the manner in which the limitations are presented does not comply with common grammatical conventions.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tom et al. (US 5704967) in view of Tam (US 5604162).

In regard to claims 16 and 17, Tom discloses an apparatus for the storage of a gas. The device includes a solid sorbent contained within a storage reservoir (fig. 6). An appropriate sorbent material is porous silicon (column 5, lines 39-43). Tom fails to disclose that the porous silicon is nanostructured, or that the pores are in the size range required by the instant claims.

Tam discloses that porous silicon is characterized by pores in the range of 1-100 nm, and that the crystallites that form the porous silicon are of similar dimensions (column 2, lines 44-48).

It would have been obvious to one of ordinary skill in the art at the time of the invention that the porous silicon disclosed as a sorbent by Tom would meet the requirements of the instant claims. Tam discloses that porous silicon is characterized by nanopores and nanocrystallites (column 2, lines 44-48). The apparatus disclosed by Tom would necessarily be capable of storing hydrogen, as it meets all the structural limitations of the device required by the instant claims utilized for that purpose.

9. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tom and Tam as applied to claim 16 above, and further in view of Nowobilski et al. (US 4749384).

In regard to claims 18 and 19, Tom discloses that the sorbent may be crushed or comminuted prior to its use in the storage reservoir (column 5, lines 31-38). Tom and Tam fail to disclose that the sorbent is compacted.

Nowobilski teaches that it is known to utilize a compacted adsorbent in a gas storage system that uses adsorbent filled reservoirs to store gas (column 2, line 67-

Art Unit: 1793

column 3, line 9). The compaction of the adsorbent allows the best utilization of the space within the storage vessel.

It would have been obvious to one of ordinary skill in the art at the time of the invention to compact the porous silicon adsorbent disclosed by Tom. Such a modification would have been motivated by the teaching in Nowobilski that compacting the adsorbent in gas storage systems allows the most efficient utilization of the storage volume (column 2, line 67 – column 3, line 9).

***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Schubert et al. (us 2004/0241507) discloses an apparatus for the storage of hydrogen utilizing porous silicon.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEVIN M. JOHNSON whose telephone number is (571)270-3584. The examiner can normally be reached on Monday-Friday 7:30 AM to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on 571-272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kevin M Johnson/  
Examiner, Art Unit 1793

/J.A. LORENZO/  
Supervisory Patent Examiner, Art  
Unit 1793